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Township of Ernestown
A Survey of the
Surface and Ground Water Conditions
in the
Community of Odessa

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TOWNSHIP OF ERNESTOWN
A SURVEY OF THE
SURFACE AND GROUND WATER CONDITIONS
IN THE
COMMUNITY OF ODESSA

INTERNAL

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Minister of the Environment

Mr. Everett Biggs,
Deputy Minister

Mr. D.S. Caverly,
Assistant Deputy Minister

Mr. K.H. Sharpe, Executive Director,
Water Supply & Pollution Control Division

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Ontario

Ministry of the
Environment

275 Ontario Street, Kingston, Ontario. K7K 2X5

546-3171

May 14, 1973.

Mr. R. Blakely,
Clerk-Treasurer,
Township of Ernestown,
Odessa, Ontario.

Dear Mr. Blakely:

Re: Township of Ernestown -
Community of Odessa
Pollution Survey

We are pleased to provide your council with the report
"A Survey of The Surface and Groundwater Conditions In The Community
of Odessa" prepared by staff subsequent to studies in 1972.

The investigations revealed that groundwater in the
Community of Odessa is severely contaminated with bacteria; thereby
jeopardizing the health of the residents. Direct and indirect discharges
of contaminated waste in and around the community is also seriously
deteriorating the quality of water in Millhaven Creek. To correct the
multitude of adverse conditions, a municipal water and sewer system is
required. As you are aware, we are presently in the final stages of
developing such systems for the municipality and hopefully construction
will commence in the fall of this year.

After council has had an opportunity to review the report, we
would be pleased to meet and discuss at their convenience any points
which may have come up.

Yours very truly,

RAD/jmc

Encl.

L.G. South, P. Eng.,
Regional Engineer,
Sanitary Engineering Branch.

TOWNSHIP OF ERNESTOWN
A SURVEY OF THE
SURFACE AND GROUND WATER CONDITIONS
IN THE
COMMUNITY OF ODESSA

REGIONAL ENGINEER'S SECTION
SANITARY ENGINEERING BRANCH
WATER MANAGEMENT

1973

REPORT ON A
WELL & WATER POLLUTION SURVEY
OF THE
TOWNSHIP OF ERNESTOWN
COMMUNITY OF ODESSA

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REPORT ON A
WELL & WATER POLLUTION SURVEY
Of The
TOWNSHIP OF ERNESTOWN
COMMUNITY OF ODESSA

Grammar ?

INTRODUCTION

The purpose of this report is to summarize the results of studies which were undertaken in[✓]the Community of Odessa during the summer of 1972. The initial study was made of the condition of the groundwater in the built-up[?] area and the present methods the residents have of obtaining a water supply. This study was carried out on June 6th and 7th, 1972.

??

The second study by students of the Water Resources Project St. Lawrence College of Applied Arts and Technology was made of the effect, if any, that the methods of private individual sewage disposal employed in Odessa are having on the surface watercourses draining the community. This particular study required locating potential and existing sources of pollution and establishing stream and outfall sampling locations for data gathering during the period of the survey. Maps included with this report indicate the aforementioned points.

The facts in this report are being presented to ensure that all concerned parties are aware of the present day surface and groundwater conditions in this community.

The assistance and information received from the following persons and organizations during the gathering of data for this report is gratefully acknowledged:

Mr. R. Blakely, Clerk-Treasurer, Township of Ernestown

Mr. P. Moccio, CPHI(C), Kingston Frontenac & Lennox & Addington Health Unit

Mr. A. Ross, P. Eng., St. Lawrence College of Applied Arts & Technology
Water Resources Project Students, St. Lawrence College of Applied Arts
& Technology

A preliminary report on the surface water conditions has been prepared by Water Resources Students at the St. Lawrence College of Applied Arts and Technology under the guidance of Mr. A. Ross, P. Eng. To complete our evaluation of both the surface and groundwater conditions, we have plagiarized sections of the report and made some basic conclusions.

LOCATION AND DESCRIPTION

The Community of Odessa, Township of Ernestown is situated on Highway #2 some 8.5 miles west of the City of Kingston. It has no municipal status or boundaries. There are no "wet" industries of any description located in the community. An area public and high school are located in the west end and the total school population is estimated to be 1,300.

TOPOGRAPHY

Millhaven Creek passes through the community with all natural drainage flowing to this main stream or one of its local tributaries. The watercourse eventually empties into the North Channel of Lake Ontario at Millhaven. The topography is generally flat with a soil overburden varying from zero to three feet. The thin overburden consists mainly of clay and till with some gravel lenses. There are several small pockets with 10 to 15 feet of soil depth over the fractured limestone rock.

POPULATION

The population of this community has varied very little over the number of years that it has been established. In 1962 the population was estimated to be 860 and the estimate for 1972 was 950. Growth by registered plans of subdivision have been rejected, or held in abeyance awaiting full municipal

services, due to the conditions present in this area for private individual methods of water supply and waste disposal.

Should full municipal water and sewerage facilities be installed, it is anticipated that the population could grow to 1,500 with an area school population growth of 2,000 by the year 1993.

EXISTING SERVICES AND GROUNDWATER CONDITIONS

As discussed previously, the residents must depend solely on individual water supplies and sewage disposal systems.

The use of private individual wells in Odessa has not met with good success as will be discussed further in the results of our well survey. Groundwater supplies are generally obtained from the limestone bedrock in this area. A water supply of this type obtains its supply from the fractures and joints in the rock at varying depths but usually less than 50 feet. The bedrock has a poor water bearing capacity. Certain areas of Odessa are also subject to groundwater chemical quality problems eg. hydrogen sulphide gas and/or salt and therefore the supply is not conducive for domestic use unless expensive individual treatment is provided. In some cases treatment is not feasible. Our Water Quality Management Branch reported, from the water well records on file that the two best wells in the vicinity yield about 10 gpm (gallons per minute) and it is very unlikely that they are capable of larger sustained yield due to the limited drawdown. *Spelling*
The average yields of this particular "aquifer" is expected to be much less than the 10 gpm quoted. In addition, we have on file several cases of wells running dry.

Due to the shallow nature of the soil over fractured limestone, surface pollution is seeping through the thin porous overburden and thereby polluting the bedrock "aquifer." It is our opinion that this has occurred extensively throughout the community.

WELL SURVEY

INTRODUCTION

An attempt was made on June 6th and 7th, 1972 to secure a bacteriological sample from each private well in Odessa so that the groundwater condition could be determined. A general questionnaire relating to the individual method of water supply and waste disposal was also filled out at that time.

The bacteriological samples collected were analysed at the Ministry of Health Laboratory in Kingston while the chemical samples were analysed at the Ministry of the Environment Laboratory in Toronto. All analyses were conducted according to "Standard Methods".

Chemical samples were also collected at random from a statistically representative number of wells and analysed for hardness, alkalinity, iron, pH, total kjeldahl as nitrogen, phosphorus and sulphate.

DISCUSSION OF BACTERIOLOGICAL RESULTS

Every resident who had his well sampled was advised in writing of the laboratory result by the Kingston, Frontenac & Lennox & Addington Health Unit. Included in the letter were suggestions as to action to follow on an individual basis pertinent to the suitability of the water sample.

Owing to the large number of premises visited, the compilation of all data on each well will not be presented in this report. If, however, this information is requested, it can be readily made available to council. Laboratory results of the private well samples are summarized in Table One. In addition, the results of samples collected by the health unit since 1968 have been included in Table Two.

TABLE ONE
SUMMATION OF PRIVATE WELL SURVEY
TOWNSHIP OF ERNESTOWN
COMMUNITY OF ODESSA

<u>CATEGORY</u>	<u>NUMBER</u>	<u>% OF TOTAL VISITED</u>
Total residences visited	247	-
No answer	78	32
Residences inspected	169	68
<u>BACTERIOLOGICAL SAMPLES</u>	<u>NUMBER</u>	<u>% OF TOTAL INSPECTED</u>
Drinking water imported	77	46
Number of wells sampled	92	54
<u>LABORATORY RESULTS</u>	<u>RESULT</u>	<u>% OF TOTAL SAMPLED</u>
*Satisfactory	25	27
**Doubtful	3	3
***Unsatisfactory	64	70
<u>INDIVIDUAL METHOD OF WASTE DISPOSAL</u>	<u>NUMBER</u>	<u>% INSPECTED</u>
Septic tank and tile field	132	78
Privy	25	15
Other	12	7
*Satisfactory (total coliform organisms = 0) (fecal coliform organisms = 0)		
**Doubtful (total coliform organisms ≤ 4) (fecal coliform organisms = 0)		
**Unsatisfactory (total coliform organisms ≥ 4) (fecal coliform organisms = present)		

TABLE TWO
SUMMATION OF BACTERIOLOGICAL RESULTS
FROM RESIDENCES IN COMMUNITY OF
ODESSA TAKEN BY FIELD STAFF
KINGSTON FRONTENAC & LENNOX & ADDINGTON
HEALTH UNIT

<u>YEAR</u>	<u>SATISFACTORY</u>	<u>DOUBTFUL</u>	<u>UNSATISFACTORY</u>
1968	6 (23%)	1 (4%)	19 (73%)
1969	9 (19%)	8 (17%)	30 (64%)
1970	8 (16%)	6 (12%)	35 (72%)
1971	15 (27%)	10 (18%)	31 (55%)

Satisfactory (total coliform organisms = 0)
(fecal coliform organisms = 0)

Doubtful (total coliform organisms ≤ 4)
(fecal coliform organisms - 0)

Unsatisfactory (total coliform organisms ≥ 4)
(fecal coliform organisms - present)

If no coliform bacteria were found in the sample then the water was classified as "satisfactory". A "doubtful" classification was given when the total coliform bacteria count was four or less and there was no fecal coliform bacteria present. A doubtful sample signals that a pathway for pollution exists and more dangerous pollution could occur when conditions change. These conditions could include heavier pollution at the source, heavier rainfall or runoff and high groundwater levels. Coliform organisms in quantities greater than four or the presence of fecal coliforms (unsatisfactory) can be regarded as being severe enough to render the water potentially dangerous to the user's health and should not be consumed unless properly treated.

DISCUSSION OF CHEMICAL RESULTS

Samples for chemical analyses were randomly collected from seven wells in the community. Five of the wells were drilled and two were dug. The samples were analysed at the Ministry of the Environment Laboratory and the results are shown in Table Three.

The constituents analysed were those commonly found in groundwater in quantities sufficient to have any practical effect upon the value of the water for domestic use.

TABLE THREE

CHEMICAL RESULTS OF SAMPLES COLLECTED FROM PRIVATE WELLSTOWNSHIP OF ERNESTOWNCOMMUNITY OF ODESSA

<u>SAMPLE LOCATION</u>	<u>HARDNESS AS CaCO_3</u>	<u>ALKALINITY AS CaCO_3</u>	<u>IRON AS FE</u>	<u>CHLORIDE AS CL</u>	<u>pH AT LAB.</u>	<u>TOTAL KJELDAHL AS N</u>	<u>PHOSPHORUS AS P TOTAL</u>	<u>SULPHATES AS SO_4</u>	<u>CONSTRUCTION OF WELL</u>
C.B. McFarland	58	49	0.10	4	7.2	0.32	0.300	8	drilled
C. Ruttan	750	499	0.05	129	6.9	0.31	0.038	197	dug
C.A. Giddy	372	294	0.25	54	7.2	0.41	0.078	39	drilled
R. Steeves	144	112	0.30	35	8.4	0.10	0.017	54	drilled
Mr. Wheeler	288	260	0.15	45	7.1	0.99	0.062	28	drilled
Mrs. C. Huff	308	296	0.25	79	7.2	0.70	1.100	54	dug
C. Bedard	392	299	0.15	112	7.1	0.59	0.170	41	drilled

1
∞
1

Note: All analyses reported in ppm with the exception of pH

Hardness (CaCO_3) - is attributable principally to calcium and magnesium and refers to the amount of soap that first must be used to precipitate the above compounds before a lather is produced. Hardness in the Odessa area is probably caused by the natural accumulations of salts from contact with the limestone formations. The detrimental effects of hardness include excessive soap consumption, formation of scums and scales, and the toughening of vegetables. All but one of the wells sampled can be considered as being very hard.

Alkalinity (CaCO_3) - is not a polluting substance or considered to be harmful to humans but it is associated with high pH values, hardness and excessive dissolved solids, all of which may be deleterious.

Iron (Fe) - can be dissolved in combination from many rocks, from well casings, water pipes, and other fixtures. The Ministry of the Environment recommends a limit of 0.3 ppm on aesthetic and taste consideration rather than physiological reasons. None of the wells sampled had an iron concentration exceeding the 0.3 ppm recommended limit.

Chloride (Cl) - was included in the survey because it may be derived from human sewage in addition to the natural mineral origin. Chlorides in water are generally not harmful to humans and restrictions on the concentrations are based on palatability requirements rather than health. The Ministry of the Environment recommends that for a water supply the chloride concentration should not exceed 250 ppm. None of the wells sampled approached this concentration; however, the fluctuations do suggest interferences from an external source.

Total Kjeldahl (N) - is a measure of the organically bound nitrogen in the water.

A rise in the organic nitrogen content may often be related to

sewage entering a water supply. Concentrations exceeding 0.5 ppm generally indicate the presence of nitrogen for biological utilization. Three of the samples taken exceeded the aforementioned range and confirm that these sources of water supply had been contaminated previously.

Phosphorus (P) - is of minor importance in the study of the groundwater conditions.

This shows the measure of both the organic and inorganic forms of phosphorus present.

Sulphates (SO_4) - occur in natural waters as a result of leaching from gypsum or other common minerals. Sulphates cause permanent hardness in water and aid in the formation of scales. A limit of 250 ppm has been established mainly because of the laxative action and although this limit was not exceeded in any of the samples, it is known sulphur exists in some wells within the community.

All of the bacteriological samples from the above noted wells were adverse except Mr. C. McFarland's whose was doubtful. The chemical results certainly substantiate the more sensitive bacteriological results that contamination of the groundwater is occurring.

SUMMARY OF GROUNDWATER CONDITONS

On reviewing the data and facts to date on the groundwater conditions, the following conclusions were reached:

- a) Approximately 68% of the residences in the Community of Odessa were contacted during the survey and 94 of these had wells which were sampled for bacteriological analyses. Seventy percent (70%) of the wells were found to be unsatisfactory for human consumption and another three percent (3%) were doubtful. Fecal coliform bacteria were found in 40% of the samples. The local health unit results presented for the period 1968 to 1971 appear to coincide with these figures.

- b) The chemical results, though lacking the sensitivity of the bacteriological analyses revealed that the groundwater is indeed being affected by leachate from individual subsurface systems.
- c) Approximately 9% of the residences surveyed had no supply of water on the property while 46% were required to import drinking water from outside sources where water is palatable and safe. Rainwater for domestic use was being collected by 41% of the residences to supplement their well supply and there were reported cases wherein the cistern was the sole source of water and this water was being consumed with little or no prior treatment. It is concluded that the property owners are being forced to other sources of water rather than the groundwater supply in the area due to bacteriological and/or chemical quality problems which render the water unsuitable for consumption.
- d) Poor shallow overburden on fractured limestone bedrock, individual waste disposal systems in close proximity to wells, waste disposal systems improperly constructed many many years ago and prior to supervision by the local health unit, deterioration of well structures over the years, and direct access of contaminating waste to the groundwater are all conditions which are concluded to be major contributing factors to the decline of the usage of groundwater in the community for human consumption. The problem is not localized in specific areas as adverse samples and conditions were obtained and observed throughout the community.

SURFACE WATER SURVEY

INTRODUCTION

A water pollution survey was commenced on June 12, 1972 by staff of the

Water Resources Project Section, St. Lawrence College of Applied Arts and Technology. Sampling stations were located on Millhaven Creek and all tributaries and drainage ditches flowing towards the creek. The accompanying maps illustrate the sample stations selected.

Analyses were conducted at the laboratory, St. Lawrence College of Applied Arts and Technology and the test procedures followed were identical to those of the Ministry of the Environment.

DISCUSSION OF SAMPLE STATIONS AND RESULTS

STATION ST - 0.13 and STATION ST - 0.42

These stations are located on a small drainage ditch at Factory Street and Highway #2. The drainage ditch originates north of the MacDonald Cartier Freeway and flows into Millhaven Creek below the Community of Odessa. The bacteriological results were as follows:

STATION ST - 0.42

<u>DATE</u>	<u>TOTAL COLIFORMS per 100 ml</u>	<u>FECAL COLIFORMS per 100 ml</u>	<u>FECAL STREPTOCOCCI per 100 ml</u>
August 2, 1972	600	28	144
August 28, 1972	Massive	400	400

STATION ST - 0.13

<u>DATE</u>	<u>TOTAL COLIFORMS per 100 ml</u>	<u>FECAL COLIFORMS per 100 ml</u>	<u>FECAL STREPTOCOCCI per 100 ml</u>
July 21, 1972	880	-	344
August 2, 1972	1200+	1200	8
August 25, 1972	420	180	60

Since the ditch drains farmland, and storm drainage along Highway #2 is directed to this watercourse, it therefore was not surprising to see the relatively high microbiological counts. In the spring, Supertest Petroleum Corporation Limited lower the lagoon contents by discharging to this watercourse for a period of approximately 10 days. The lowering is conducted under the supervision

of Ministry staff and in the past there have been no problems or deterioration of the quality of water. Since there was no discharge from this establishment during the survey, the results above bear no relationship with the treatment facilities located on the watercourse. The high fecal coliform counts at Factory Street suggest the intrusion of human waste into the stream south of Highway #2.

STATION H.S. - 0.55

The small stream flowing parallel and between the MacDonald Cartier Freeway & Highway #2 was sampled behind the Ernestown Secondary School. The results indicate the presence of some pollutants.

<u>DATE</u>	<u>TOTAL COLIFORMS</u> <u>per 100 ml</u>	<u>FECAL COLIFORMS</u> <u>per 100 ml</u>	<u>FECAL STREPTOCOCCI</u> <u>per 100 ml</u>
July 21, 1972	360	4	124
August 25, 1972	1200+	60	600

The septic tank systems serving the Public School and the Secondary School have constantly been a problem to the Board of Education. In cooperation with the health unit every effort has been taken to minimize the discharge and ponding effect which of course is very serious when you consider the number of children in the area.

Several small suspicious outfall pipes were noticed along this watercourse but there was no discharge at the time of the survey.

STATION M.C. - 9.54

This station is located on Millhaven Creek upstream of the community and just north of the MacDonald Cartier Freeway. The bacteriological results are normal for such a body of water. The total coliform bacteria are predominantly soil bacteria.

<u>DATE</u>	<u>TOTAL COLIFORMS</u> <u>per 100 ml</u>	<u>FECAL COLIFORMS</u> <u>per 100 ml</u>	<u>FECAL STREPTOCOCCI</u> <u>per 100 ml</u>
August 2, 1972	68	4	16
August 28, 1972	136	4	8

STATION M.C. - 9.20

Samples collected at Highway # 2 and Millhaven Creek certainly indicate that pollutants from the main section of the community are gaining access to the watercourse. Direct septic tank discharges or shallow groundwater flow systems discharging to the local creek and carrying contamination from subsurface systems are the results of the high bacteriological counts.

<u>DATE</u>	<u>TOTAL COLIFORMS per 100 ml</u>	<u>FECAL COLIFORMS per 100 ml</u>	<u>FECAL STREPTOCOCCI per 100 ml</u>
July 21, 1972	1200+	1200+	36
August 2, 1972	1200+	520	84
August 25, 1972	1200+	4	52

STATION M.C. - 8.95

The results of samples collected further downstream continued to show the presence of high numbers of bacteria.

<u>DATE</u>	<u>TOTAL COLIFORMS per 100 ml</u>	<u>FECAL COLIFORMS per 100 ml</u>	<u>FECAL STREPTOCOCCI per 100 ml</u>
August 21, 1972	1200+	388	132
September 2, 1972	600	196	100
September 25, 1972	2000	4	36

STATIONS M.C. - 7.49; M.C. - 7.41; M.C. - 7.33; M.C. - 7.00;
M.C. - 6.75; M.C. - 5.40

All of the remaining stations are downstream of the community and adjacent to residents utilizing shore wells as the source of water supply. The bacteriological results for each station are as follows:

STATION M.C. - 7.49

<u>DATE</u>	<u>LOCATION</u>	<u>TOTAL COLIFORMS per 100 ml</u>	<u>FECAL COLIFORMS per 100 ml</u>	<u>FECAL STEPTOCOCCI per 100 ml</u>
June 19	Adjacent to Mr. Haaksman's residence	296	8	56
June 26	"	360	84	120

June 28, 1972	Adjacent to Mr. Haaksman's residence	680	40	<u>60</u>
July 7, 1972	"	-	156	-
July 21, 1972	"	360	192	24

STATION M.G. - 7.41

<u>DATE</u>	<u>LOCATION</u>	<u>TOTAL COLIFORMS per 100 ml</u>	<u>FECAL COLIFORMS per 100 ml</u>	<u>FECAL STREPTOCOCCI per 100 ml</u>
June 19	Adjacent to Mr. Laird's residence	220	12	<u>184</u>
July 21	"	444	192	24
August 2	"	424	8	<u>240</u>
August 25	"	340	1	<u>80</u>

STATION M.C. 7.33

<u>DATE</u>	<u>LOCATION</u>	<u>TOTAL COLIFORMS per 100 ml</u>	<u>FECAL COLIFORMS per 100 ml</u>	<u>FECAL STREPTOCOCCI per 100 ml</u>
August 2	Adjacent to Mr. D. Peters' residence	152	28	<u>24</u>
August 25	"	236	12	104

STATION M.C. - 7.00

<u>DATE</u>	<u>LOCATION</u>	<u>TOTAL COLIFORMS per 100 ml</u>	<u>FECAL COLIFORMS per 100 ml</u>	<u>FECAL STREPTOCOCCI per 100 ml</u>
June 19	Adjacent to Mr. R. Mulder's residence	308	12	<u>72</u>
June 26	"	320	44	<u>84</u>
June 28	"	560	40	<u>50</u>
July 5	"	160	64	36
July 21	"	440	356	100
August 2	"	168	12	<u>60</u>
August 25	"	400	8	<u>84</u>

STATION M.C. - 6.75

<u>DATE</u> <u>1972</u>	<u>LOCATION</u>	<u>TOTAL COLIFORMS</u> <u>per 100 ml</u>	<u>FECAL COLIFORMS</u> <u>per 100 ml</u>	<u>FECAL STREPTOCOCCI</u> <u>per 100 ml</u>
June 19	Adjacent to Mr. R. Warner's residence	320	12	48
June 21	"	360	192	-
June 26	"	920	88	72
June 28	"	900	50	100
July 5	"	1800	60	0
July 21	"	272	208	60
August 2	"	216	16	200
August 25	"	366	8	140

STATION M.C. - 5.40

<u>DATE</u>	<u>LOCATION</u>	<u>TOTAL COLIFORMS</u> <u>per 100 ml</u>	<u>FECAL COLIFORMS</u> <u>per 100 ml</u>	<u>FECAL STREPTOCOCCI</u> <u>per 100 ml</u>
June 19	Adjacent to Mr. F. Derue's residence	228	4	88
June 21	"	1060	336	-
June 26	"	228	40	44
June 28	"	400	80	70
July 5	"	240	40	20
July 21	"	228	164	100
August 2	"	232	48	176
August 25	"	216	48	200

The last station is not shown on the map; however, it is located 3.8 miles downstream from Highway #2.

SUMMARY OF SURFACE WATER CONDITIONS

Direct discharge or leachate from contaminated sources in the Community

of Odessa is deteriorating the quality of water in the area watercourses and in particular Millhaven Creek.

SHORE WELL SURVEY

INTRODUCTION

A detailed study was also conducted (by staff of the Water Resources Project Section) of the domestic water supply used by residents below the Community of Odessa. These residents use shore wells near the base of Millhaven Creek and therefore the supplies were in all probability hydraulically connected with the creek. Wells located within 100 feet of the creek and within a two mile distance downstream of the community were considered as sampling stations. Permission was finally obtained from seven homeowners for sampling the drinking water supply on a regular basis. The people on this type of supply recognized that contamination of the wells was probable; therefore all of them had installed various types of filters.

DISCUSSION OF SAMPLE RESULTS

In the course of sampling 29 bacteriological samples were collected and even with the individual treatment system only 27% of the samples were satisfactory. In fact, the conditions had reached alarming proportions as 41% of the samples contained fecal coliforms. At least one sample from each house was contaminated and in some instances as many as four samples were contaminated. The results of the shore well survey is summarized in the table below:

TABLE FOUR - BACTERIOLOGICAL RESULTS OF SAMPLES COLLECTED FROM DRINKING WATER SUPPLIES OF RESIDENCES DOWNSTREAM OF THE COMMUNITY OF ODESSA

Number of samples collected	29
Samples satisfactory	8 (27%)
Samples doubtful	2 (7%)
Samples unsatisfactory	19 (66%)
Samples with fecal coliforms	12 (41%)
Samples with fecal streptococci	15 (52%)

The residents should endeavour to provide a greater degree of treatment to the supply and in this regard complete treatment is suggested. The filters will "screen" out solids that may have entrapped some bacteria; however it is dangerous to expect complete bacteria removal by filtration alone.

SUMMARY OF SHORE WELL SUPPLIES

Due to upstream conditions, utilizing Millhaven Creek as a source of domestic water supply cannot be considered as good. The water quality is affected by the following; inadequate private sewage disposal systems in and around the Community of Odessa, drainage from agricultural operations, surface storm drainage from the Community of Odessa and large numbers of wild waterfowl which nest and rest on the upstream lake. The effect of these conditions is presently intensified during the summer months due to the limited flow and available dilution in the creek.

Millhaven Creek would not be considered as a source of private water supply if there was available adequate groundwater. In view of the noted conditions now affecting this water, it is recommended that it only be used for drinking purposes after receiving the following treatment; coagulation, settling, filtration, pre and post chlorination with sufficient contact time and a chlorine residual of 0.5 ppm (parts per million). Such a form of treatment is considered necessary in view of the present bacteriological and likely virus quality of this water. It is recognized that extensive treatment like this would be both expensive and difficult to maintain for the average homeowner. Such a form of treatment would not be appreciately affected by the proposed treated effluent to be discharged from the Community of Odessa.

The proposed new dam will give an assured minimum summer time flow of five cubic feet per second which of course will provide greater dilution. Present summer time flows in dry years is less than one cubic feet per second.

In conclusion, the present degree of treatment being provided by residents

along Millhaven Creek (utilizing the creek for water supply) should not be considered adequate in view of the present raw water quality condition. If the treatment is made adequate, there would be no appreciable adverse affect imposed upon this water as a result of the proposed treated effluent from the Community of Odessa.

PROPOSED WATER & SEWER SERVICES

The Township of Ernestown have entered into an agreement with the Province to provide water and sewer facilities for the residents in the Community of Odessa. The sewage project will consist of the following works:

1. A 200,000 imperial gallon per day package sewage treatment plant (secondary treatment) with grit removal facilities, aeration tanks, settling, chlorination, control building and outfall to Millhaven Creek.
2. A sewage pumping station located south of Emma Street and south west of Factory Street.
3. Sewage service to all the built-up areas of the community.

The water project would consist of the following:

1. The existing water treatment plant to be modified and expanded.
Treatment to consist of solids separation, coagulation and flocculation, filtration, chlorination, taste and odour removal and pH adjustment.
2. A new 10 inch diameter intake into Millhaven Creek, the source of supply.
3. Storage on the system by a 20 foot diameter standpipe, 135 feet high.
4. A network system of watermains to service the developed portion of the community.

The Ministry of the Environment expects construction will commence on the works in September or October, 1973.

HEALTH PROBLEMS

The medical profession have contacted the Ministry of the Environment office to report a high degree of diarrhoea among the patients from Odessa. Stool specimens from families drinking contaminated water were also tested and found to contain salmonella bacteria. Other diseases which are abnormally being encountered are infectious hepatitis and gastro intestinal problems.

As mentioned previously, the School Board has been plagued with problems in operating the subsurface systems. Ponding has occurred periodically thereby resulting in serious health problems around the school.

In summary, the above instances clearly exhibited the most serious health problems and the need for municipal services at the earliest date possible

STEAMFLOW DATA

Streamflow data for Millhaven Creek consisting of daily discharges was recorded during open water periods from June 1968 through 1970 by a recording type gage located near Millhaven. The lowest and maximum average flow recorded was 3.0 cubic feet per second (cfs) and 225 cfs respectively. The partial flow duration curve for this period indicates well sustained low flows. However, 1968, 1969, and 1970 had been years of above normal precipitation and the recorded flows likely represent slightly above normal streamflows.

Historical streamflow conditions, derived from discussions with residents in the basin, indicated that streamflow has ceased during years or prolonged periods of deficient precipitation. To ensure a continuous water supply source and at the same time provide sufficient assimilation capacity for a continuous discharge from the waste treatment facilities a flow of 1.9 cfs is required. The Cataraqui Conservation Authority by constructing a reservoir in Odessa Lake and Peter's Lake and raising the level by approximately two feet can provide a continuous flow in

Millhaven Creek to meet the requirements of both the Ministry's projects. The reservoir would have a storage capacity of 3000 acre-feet and for a 273-day augmentation period a discharge of 5.6 cfs from the reservoir is possible.

SUMMARY

A ground and surface water survey was conducted in the Community of Odessa in 1972 by staff of a) the Kingston, Frontenac and Lennox and Addington Health Unit b) St. Lawrence College of Applied Arts and Technology and c) the Ministry of the Environment.

Results of samples collected from wells within the community indicate that about 70% were contaminated at the time of the survey. Without question, seepage from septic tank systems, privies and cesspools is entering the wells. In addition, seepage from the above systems follow shallow flow systems and eventually discharge to the local watercourses. Millhaven Creek is certainly being affected with these discharges.

Although no epidemiological surveys have been made to measure disease incidence in this area, it is certain that sewage is entering the wells and therefore a serious health hazard situation has developed. The medical profession is concerned with the high incidence of gastro intestinal problems in Odessa and have related the health problems to the individual drinking water supplies.

During the survey, a high incidence of bacterial contamination was noted in the domestic water supplies of residents downstream of Odessa. These residents utilize shore wells which are hydraulically connected to the creek. Treatment normally consists of a small domestic filter. Since the quality of water in Millhaven Creek is being affected by many adverse conditions, complete treatment should be provided before this water is used for domestic purposes.

To correct the obvious health and pollution problems, the municipality has entered into an agreement with the Province to provide a municipal water and sewage works. It is hoped that construction will commence on these projects in the fall of 1973.

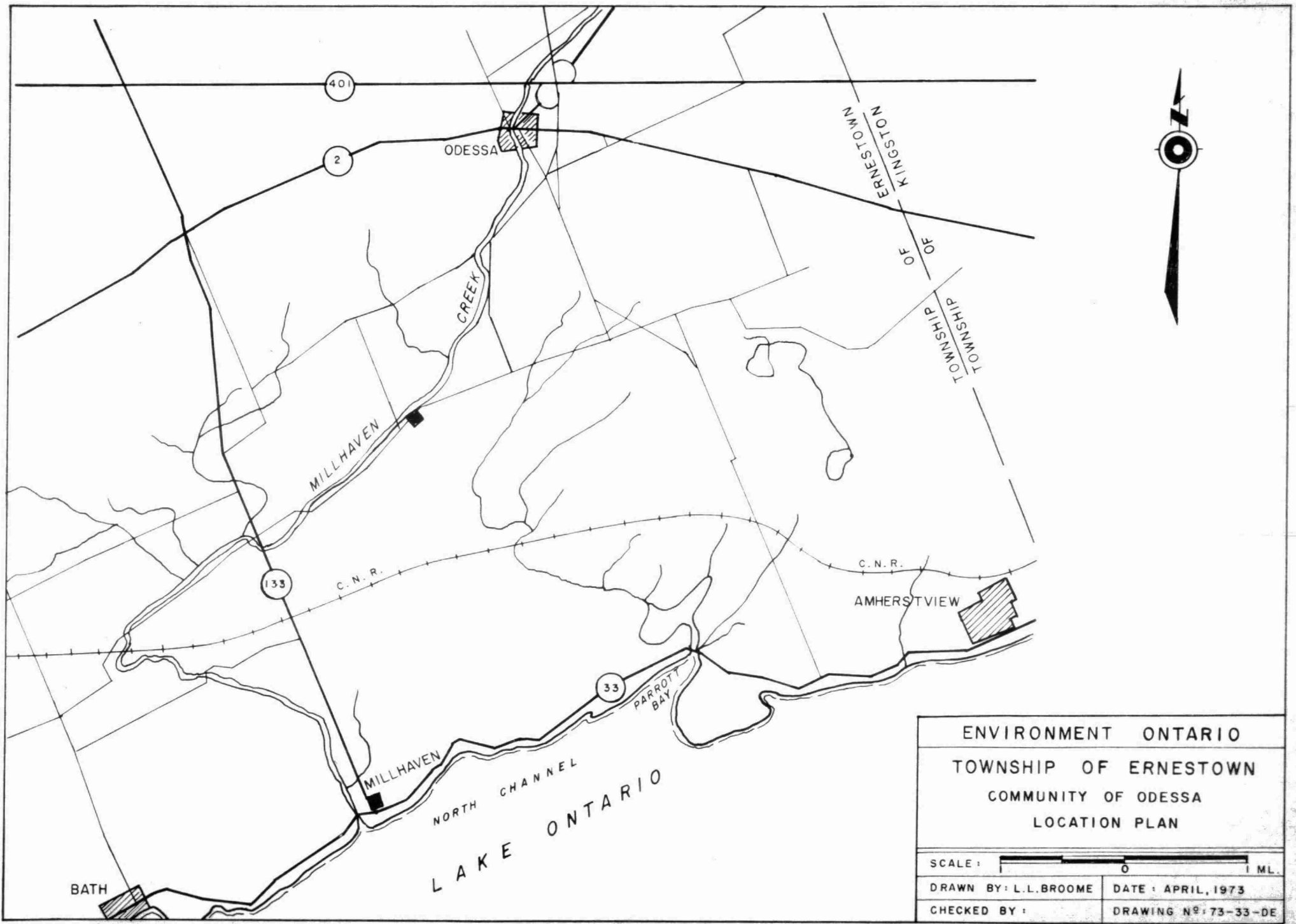
Summaries at the end of the sections well survey, surface water survey and shore well survey should be thoroughly reviewed.

RECOMMENDATIONS

1. A public water supply system should be installed to furnish the Community of Odessa with safe potable water.
2. A public sewage collector and disposal system should be installed to end the pollution of the ground and surface waters.
3. It is strongly recommended to residents utilizing shore wells that they provide complete treatment to the water before use for domestic purposes.

RAD/jmc

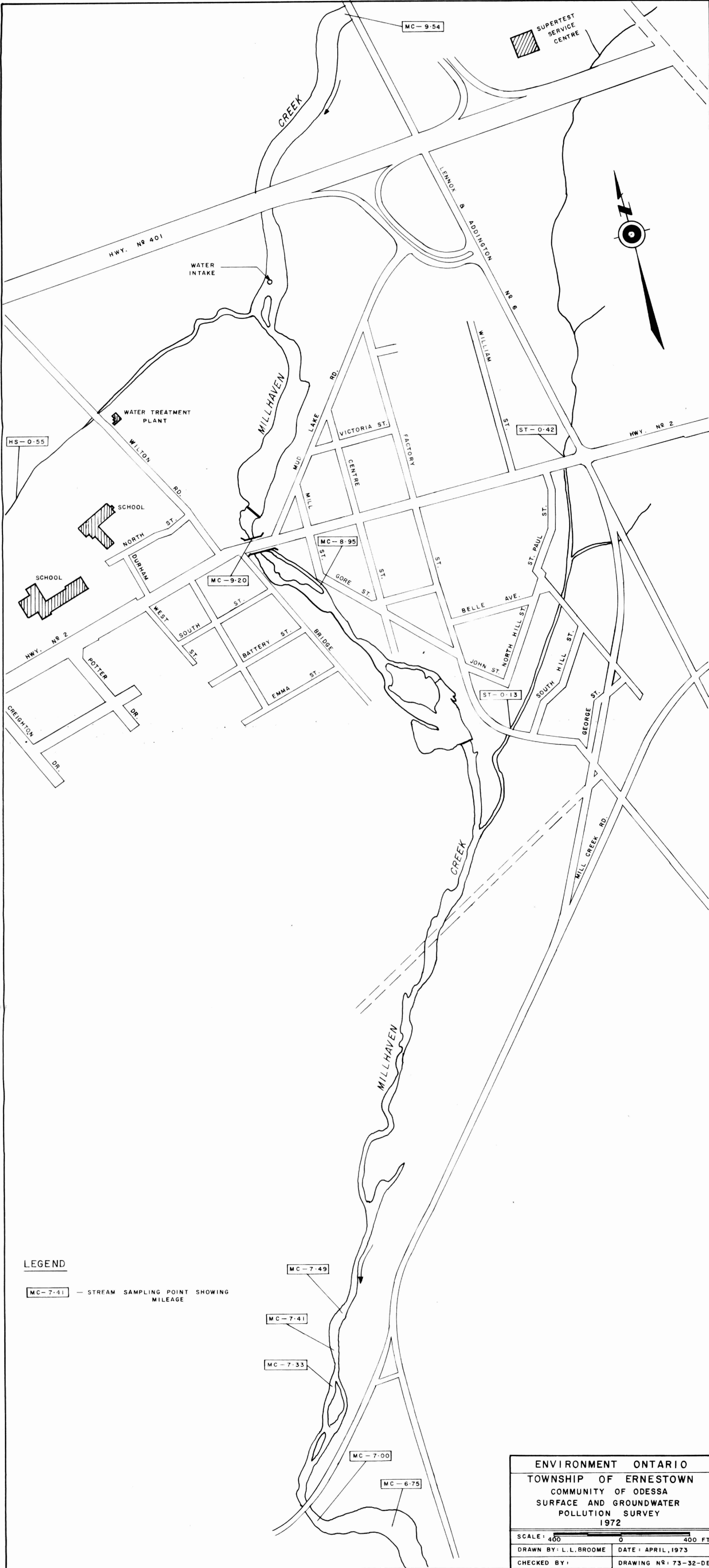
Report prepared by *R. A. Dunn*
R.A. Dunn, P. Eng.,
Sanitary Engineering Branch.



INTERPRETATION AND SIGNIFICANCE OF BACTERIOLOGICAL RESULTS

Bacteriological Examination

The bacteriological indicators of contamination used during the survey were total and fecal coliform organisms and fecal streptococcus organisms. Coliform organisms are most commonly found in human and animal excrement but they can also be found in soil. They are always present in large numbers in untreated sewage and are in general relatively few in number in other stream pollutants. The fecal coliform and fecal streptococcus organisms are more selected indicators of pollution. Fecal coliforms are indicators of human or animal waste. Several investigators have found that in relationship between the number of fecal coliforms and the number of fecal streptococci present in a sample depends on the source of the waste being examined. It has been found that in wastes from humans, there are a greater proportion of fecal coliforms than fecal streptococci.



LEGEND

MC-7-41 — STREAM SAMPLING POINT SHOWING MILEAGE

ENVIRONMENT ONTARIO	
TOWNSHIP OF ERNESTOWN	
COMMUNITY OF ODESSA	
SURFACE AND GROUNDWATER	
POLLUTION SURVEY	
1972	
SCALE: 400 0 400 FT.	
DRAWN BY: L.L.BROOME	DATE: APRIL, 1973
CHECKED BY:	DRAWING NO: 73-32-DE

Date Due

ONTARIO
Ministry of the Environment
TOWNSHIP OF ERNESTOWN
A SURVEY OF THE SURFACE AND
GROUND WATER CONDITIONS IN
THE COMMUNITY OF ODESSA,

1972

~~TERMINAL STREAM: MILLHAVEN CE.~~

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